

Article

A Study on the Construction of an Evaluation Index System for the Educational Effect of College Volleyball Courses from the Perspective of Cultivating the Spirit of Putting the Motherland First

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Abstract: Cultivating virtue and educating people remains the fundamental task of higher education in the new era, and the patriotic spirit of "putting the motherland first" serves as the core soul and value foundation of this comprehensive cultivation process. Integrating this profound spirit organically into college volleyball courses represents an essential task for modern college physical education to successfully implement the broader strategy of moral and academic development. However, a comprehensive review of current electronic literature reveals that researchers have not yet identified or established a standardized evaluation index system for assessing the effectiveness of college volleyball courses in cultivating this patriotic spirit. This critical gap makes it exceedingly difficult to accurately diagnose, monitor, and continuously improve the overall effectiveness of moral education within this specific athletic context. Therefore, this study addresses this significant academic void by utilizing a robust methodological framework that includes the literature research method, the Delphi method, the analytic hierarchy process (AHP), and rigorous mathematical statistics. Taking the cultivation of the spirit of "putting the motherland first" as a primary starting point, this research aims to systematically construct a comprehensive evaluation index system for the educational effectiveness of college volleyball courses. Ultimately, this newly developed framework provides a reliable scientific basis for the quantitative evaluation of patriotic education in collegiate sports. Furthermore, it offers substantial practical support for the successful implementation of the fundamental task of cultivating virtue and educating people across diverse physical education curricula.

Keywords: patriotism; physical education; volleyball; moral education; evaluation system

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1. Background and Research Rationale

Fostering virtue through education is the fundamental foundation of higher education institutions [1]. Ideological and political work should permeate the entire process of education and teaching. Guidelines for curriculum-based ideological and political education in institutions of higher education emphasize that physical education courses should focus on patriotism education and traditional Chinese culture education, providing direction for value cultivation in college volleyball courses.

The spirit of prioritizing the collective good is a concrete embodiment of patriotism in the field of sports. The women's volleyball spirit fully demonstrates a mental outlook characterized by prioritizing collective interests, solidarity, collaboration, perseverance, and resilience [1]. With its inherent characteristics of confrontation and teamwork, volleyball serves as an optimal medium for cultivating the spirit of prioritizing the collective good.

Nevertheless, the current evaluation of curriculum-based ideological and political education in college volleyball courses still centers on athletic skills and physical fitness [2]. There is a lack of scientific observation tools to measure the attainment of ideological and political goals such as the spirit of prioritizing collective interests, making it difficult to quantify the effectiveness of value cultivation and providing insufficient support for teaching improvement.

Against this backdrop, this study focuses on the value cultivation effects of college volleyball courses in fostering the spirit of prioritizing collective interests. It comprehensively adopts the Delphi method and analytic hierarchy process (AHP) to construct a scientific and systematic evaluation index system [3]. The research not only provides a quantitative assessment tool for curriculum-based ideological and political education in college physical education, but also offers practical evidence for promoting the women's volleyball spirit and fulfilling the fundamental task of fostering virtue through education.

1.1. The Spirit of "Country First" Is the Core Competence for University Physical Education Teachers to Fulfill the Fundamental Task of Fostering Virtue through Education

Against the backdrop of comprehensively advancing the construction of curriculum-based political and ideological education, university physical education teachers are not only tasked with imparting sports skills but also bear the educational mission of value guidance and spiritual shaping [4]. As the primary core of the "Chinese Women's Volleyball Spirit," the concept of "Country First" has been incorporated into the spiritual heritage of the nation, epitomizing the patriotism and sense of responsibility of those working in the field of sports. At present, some physical education teachers still exhibit deficiencies in their awareness of curriculum-based political and ideological education, theoretical literacy, and capacity for value guidance, which constrains the full realization of the educational function of physical education courses. From the perspective of educational psychology, teachers' value identification serves as the prerequisite for the internalization of their teaching behaviors. Internalizing the spirit of "Country First" as a core competence for physical education teachers is the critical prerequisite for enhancing their ability to implement curriculum-based political and ideological education and for fulfilling the fundamental task of fostering virtue through education. Only when teachers themselves possess firm national identity and patriotic sentiments can they achieve the seamless integration of ideological and political education into volleyball teaching.

1.2. The Volleyball Specialized Course and the Spirit of "Country First" Share a High Degree of Educational Compatibility

University volleyball courses, by virtue of their inherent characteristics such as teamwork, shared honor, and perseverance, possess a natural intrinsic connection with the concepts of "winning recognition for the nation" and "collaboration and unity" embedded in the spirit of "Country First." Research has shown that the construction of curriculum-based political and ideological education in volleyball courses can effectively cultivate students' sense of social responsibility, national pride, and a spirit of cooperation. According to the theory of national identity, individuals develop a sense of belonging to a community through engagement in collective practical activities. The integration of the Chinese Women's Volleyball Spirit into volleyball teaching helps guide students to comprehend, through skill learning and competitive practice, the value concept that "personal striving aligns with national recognition." Therefore, the volleyball course is not only a vehicle for imparting sports skills but also an ideal arena for transforming the spirit of "Country First" into ideological and political educational content that students can perceive, practice, and internalize [5]. This provides a solid curricular and practical foundation for this study to further construct an evaluation index system for assessing the educational outcomes of this particular spiritual dimension.

1.3. Constructing a Scientific Evaluation Index System for Educational Outcomes Is a Key Breakthrough in Deepening the Curriculum-Based Political and Ideological Education of Volleyball Courses

The evaluation of the effectiveness of curriculum-based political and ideological education is a crucial component for assessing educational quality and driving teaching improvements. However, the current evaluation of ideological and political education in physical education courses faces challenges such as unscientific index systems, overly simplistic evaluation methods, and a lack of targeted instruments. Existing studies primarily explore the theoretical framework of ideological and political education evaluation in physical education courses at a macro level, leaving gaps in quantitative evaluation index systems that specifically address the core spiritual dimension of "Country First." Developing a scientific, systematic, and practical evaluation index system for educational outcomes, which translates the abstract goal of the "Country First" spirit into observable and measurable indicators, is essential for accurately assessing the effectiveness of ideological and political education in university volleyball courses. This approach also represents a necessary step toward advancing such education from experience-based methods to scientific evaluation and continuous optimization. Addressing this practical need, this study aims to construct an evaluation index system for educational outcomes centered on the "Country First" spirit, thereby bridging the gap in quantitative tools within this field and providing actionable evaluation support to achieve the fundamental goal of fostering virtue through education.

2. Research Subjects and Methods

2.1. Research Subjects

2.1.1. Research Subject

The development of an evaluation index system for assessing educational outcomes related to the "Country First" spirit in university volleyball courses [6].

2.1.2. Delphi Method Survey Respondents

Experts specializing in ideological and political education, volleyball instruction, Olympic champion women's volleyball athletes, and experienced volleyball coaches [7].

2.2. Research Methods

2.2.1. Literature Review Method

This study utilizes domestic and international academic literature, policy documents, and research reports to establish a robust theoretical foundation and draw on practical experience [1]. Key topics include the educational function of the Chinese Women's Volleyball Spirit, curriculum-based political and ideological education in university volleyball courses, and educational evaluation. The research aims to clarify objectives and preliminarily construct an evaluation indicator pool for assessing the educational outcomes of university volleyball courses, emphasizing the cultivation of the spirit of "Country First."

2.2.2. Delphi Method

A total of 15 experts were selected from the fields of ideological and political education, volleyball teaching, Olympic champion volleyball players, and senior volleyball coaches. The inclusion criteria for experts were: (1) holding a deputy senior or higher professional title, or serving as a senior coach for a national/provincial team, or being an Olympic champion or world champion; (2) having more than 10 years of experience in the relevant field; (3) possessing in-depth research or extensive practical experience in the Chinese Women's Volleyball Spirit or curriculum-based political and ideological education. The composition of experts was as follows: 5 university volleyball course teachers (2 of whom were also Olympic champions), 5 volleyball coaches from sports teams, and 5 university ideological and political education teachers. All experts voluntarily participated and completed two rounds of consultation. Previous studies have

applied this method to construct indicator systems for the ideological and political elements of public physical education courses, the evaluation index system for physical education health care courses for disabled and frail college students, and the after-school sports service quality evaluation system under the "Double Reduction" policy, and their validity and reliability have been empirically tested.

2.2.3. Analytic Hierarchy Process

In the second round of expert consultation, experts were asked to use the Saaty 1-9 scale method to perform pairwise comparisons of indicators at the same level and construct judgment matrices. The Yaahp 10.0 software was utilized to calculate the weights of indicators at each level. A consistency test was conducted on each expert's judgment matrix individually. If the consistency ratio (CR) was ≥ 0.1 , the expert was required to readjust the matrix until all matrices passed the consistency test. The geometric mean method was employed to aggregate the judgment matrices of all 15 experts, resulting in a comprehensive judgment matrix [8]. The Analytic Hierarchy Process has a well-established foundation for application in physical education teaching evaluation research. Scholars have applied this method to construct an evaluation system for the hidden curriculum of campus football, a teaching evaluation scale for practical physical education courses, and an indicator system for factors influencing the implementation of university physical education classes, all of which provide solid theoretical support and practical reference for the selection of this method in the present study.

2.2.4. Mathematical Statistics Method

SPSS 26.0 was employed to compute statistical measures such as mean, standard deviation, coefficient of variation, and Kendall's W coefficient of concordance [6]. Yaahp 10.0 was utilized for weight determination and consistency verification within the Analytic Hierarchy Process.

3. Theoretical Construction and Indicator Screening of the Evaluation Scale

3.1. Empirical Pre-Selection of Evaluation Indicators

Using the logical induction method, this study systematically reviewed descriptions of patriotic sentiments in fostering virtue through education and the Implementation Outline for Patriotic Education in the New Era. These were combined with the core expressions of the "Country First" spirit exemplified by the Chinese Women's Volleyball Team and relevant literature on ideological and political education evaluation to form an initial indicator pool. After discussion within the research team, indicators with similar wording were merged, and those with overlapping content were removed, ultimately determining the indicator set for the first round of Delphi consultation: 5 first-level indicators, 18 second-level indicators, and 18 third-level indicators. Details are presented in Table 1.

Table 1. Content Framework of the Evaluation Index System for Educational Outcomes in Cultivating the "Country First" Spirit (Preliminary Draft)

First-Level Indicators	Second-Level Indicators	Third-Level Indicators
Patriotic Sentiment	Striving to Win Glory for the Country	Regards bringing honor to the country as the primary goal in study and daily life
	Always Putting National Interests First	Always places national interests above all else in study and daily life
	Resolutely Protecting the Country	Does not allow anyone to engage in actions that tarnish the country's image in study and daily life

	Strong Sense of National Pride	Sincerely demonstrates pride and confidence when discussing national development achievements and glorious sports history
National Identity	Firm Political Identity	Remains steadfast in upholding the leadership of the Communist Party of China
	Firm National Faith	Takes pride in being Chinese and is willing to safeguard the image of the Chinese people
	Firm Confidence in National Culture	Takes pride in China's outstanding traditional culture and is willing to understand and promote it
	Identification with National Unity and Territorial Integrity	Upholds national territorial integrity and supports national reunification
Consciousness of Dedication to the Nation	Establishing Lofty Ideals of Dedication to the Country	Can reflect on and plan how personal future development can serve social and national needs
	Resolutely Safeguarding National Reputation	Demonstrates good sportsmanship and national image in study and daily life
	Possessing a Strong Sense of Collective Honor	Regards team victory as the highest honor and is willing to sacrifice personal interests for team success
	Firmly Complying with National Policies	Proactively undertakes tasks, disregards personal gains or losses, and serves national objectives
Consciousness of Upholding the Nation	Strictly Abiding by National Order	Strictly abides by social rules and regards rule awareness as a fundamental respect for the collective and the nation
	Cherishing National Symbols	Maintains solemnity and reverence during flag-raising ceremonies and when singing the national anthem, with heartfelt respect
	Resisting Improper Words and Deeds	Does not disseminate or echo statements that harm national interests, whether online or in daily life
Consciousness of Promoting the Nation	Actively Spreading Positive National Energy Through Sports	Is adept at using sports platforms to tell Chinese stories and disseminate positive values
	Closely Connecting Competitive Striving with National Honor	Regards every instance of striving as fighting for national honor
	Inheriting and Practicing the "Chinese Women's Volleyball Spirit"	Demonstrates the spirit of "Country First" in times of difficulty

3.2. Expert Authority Level

3.2.1. Basic Information of Experts

Fifteen experts were selected from the fields of volleyball course teaching, sports team volleyball coaching, university ideological and political education, and Olympic champion volleyball players. Consultation questionnaires were distributed via email [8]. The expert group consisted of five university volleyball course teachers, five sports team volleyball coaches, five university ideological and political education teachers, and two Olympic champion volleyball players, who were also included among the volleyball course teachers and coaches.

3.2.2. Expert Activeness Level

In both rounds of the Delphi consultation, 15 questionnaires were distributed and returned each time, achieving a response rate of 100%.

3.2.3. Expert Authority Level

The authority level of experts was determined by the authority coefficient (Cr), which is composed of two factors: the judgment basis (Ca) and the familiarity level (Cs). A higher Cr value indicates a higher level of expert authority, with $Cr \geq 0.7$ considered acceptable. The judgment basis was divided into four dimensions: practical experience, theoretical analysis, reference to domestic and international materials, and intuitive perception [9]. Each dimension was assigned values according to three levels (high/medium/low): practical experience (0.5/0.4/0.3), theoretical analysis (0.3/0.2/0.1), reference materials (0.1/0.1/0.05), and intuitive perception (0.1/0.1/0.05). According to the statistical results, the mean values assigned by experts across the four dimensions of the judgment basis (Ca) were: practical experience 0.45 (between high and medium), theoretical analysis 0.25 (between high and medium), reference to domestic and international materials 0.10 (medium), and intuitive perception 0.08 (medium), yielding a total Ca of 0.88. The mean score for experts' familiarity with the indicators (Cs) was 0.856. Based on the formula $Cr = (Ca + Cs) / 2$, the mean authority coefficient was calculated to be 0.868. The specific values for each first-level indicator varied slightly, as detailed in Table 2.

Table 2. Expert Authority Coefficients (by First-Level Indicator)

First-Level Indicator	Judgment Basis (Ca)	Familiarity Level (Cs)	Authority Coefficient (Cr)
Patriotic Sentiment	0.89	0.87	0.88
National Identity	0.88	0.86	0.87
Consciousness of Dedication to the Nation	0.87	0.84	0.855
Consciousness of Upholding the Nation	0.88	0.85	0.865
Consciousness of Promoting the Nation	0.88	0.86	0.87
Mean Value	0.88	0.856	0.868

3.3. Indicator Screening Process and Criteria

The Delphi consultation questionnaire utilized a 5-point Likert scale, assigning scores as follows: 5 for "very important," 4 for "relatively important," 3 for "moderately important," 2 for "relatively unimportant," and 1 for "very unimportant." The indicator screening criteria were based on established standards, requiring that an indicator meet all three of the following conditions for selection: mean value (M_j) > 3.00, coefficient of variation (CV) < 0.35, and full-score rate (%) > 20%. Indicators meeting all three criteria were retained for inclusion [9].

3.3.1. Results of the First-Round Indicator Screening and Revision

During the first round, 15 questionnaires were distributed, all of which were returned and deemed valid, resulting in a 100% response rate. The analysis included four first-level indicators, with statistical results summarized in Table 3. Each indicator demonstrated mean values exceeding 3.9, coefficients of variation below 0.25, and full-score rates surpassing 20%, ensuring their retention. Further details are provided in Table 3.

Table 3. Statistical Results of First-Level Indicators in the First Round

3.3.2. Results of the First-Round Indicator Screening and Revision

In the first round, 15 questionnaires were distributed, and all were returned, resulting in a 100% response rate. A total of four first-level indicators were evaluated, with statistical results summarized in Table 3. Each first-level indicator achieved a mean value exceeding 3.9, a coefficient of variation below 0.25, and a full-score rate above 20%, leading to their retention. Further details are provided in Table 3.

Table 3. Statistical Results of First-Level Indicators in the First Round

First-Level Indicator	Mean	Standard Deviation	Coefficient of Variation	Full-Score Rate
Patriotic Sentiment	4.8667	0.3519	0.0723	0.8667
National Identity	4.1333	0.9155	0.2215	0.4667
Consciousness of Dedication to the Nation	4.8000	0.5606	0.1168	0.8667
Consciousness of Upholding the Nation	3.8000	0.8619	0.2268	0.2667
Consciousness of Promoting the Nation	3.8000	0.8619	0.2268	0.2667

3.3.3. Results of the First-Round Indicator Screening and Revision (Continued)

There were 18 second-level indicators in total. The statistical results and revision details are presented in Table 4. Based on the screening criteria: 1 Indicator 1, "Striving to Win Glory for the Country," had a mean value of 3.6, a coefficient of variation of 0.1757, and a full-score rate of 6.67%, which was slightly low but retained; the expert suggestion to revise it to a more specific expression was adopted. 2 Indicator 3, originally "Resolutely Protecting the Country," was revised to "Safeguarding National Dignity" based on expert suggestions, and this was adopted. 3 Indicator 6, originally "Firm National Faith," was revised to "Firm Identity Belonging" based on expert suggestions, and this was adopted. 4 Indicator 9, originally "Establishing Lofty Ideals of Dedication to the Country," was revised to "Firm Commitment to Serving the Nation's Interests" based on expert suggestions, and this was adopted. 5 Indicator 12, "Firmly Complying with National Policies," had a mean value of 3.4667, a coefficient of variation of 0.2405, and a full-score rate of only 6.67%, and was therefore deleted. 6 Indicator 17, originally "Closely Connecting Competitive Striving with National Honor," was revised to "Striving for the Country" based on expert suggestions, and this was adopted. 7 Indicator 18, originally "Inheriting and Practicing the 'Chinese Women's Volleyball Spirit,'" was revised to "Spiritual Inheritance" based on expert suggestions, and this was adopted [10]. The remaining indicators all met the criteria. Ultimately, 17 second-level indicators were retained.

Table 4. Statistical Results and Revisions of Second-Level Indicators in the First Round

Original Second-Level Indicator	Mean	Coefficient of Variation	Full-Score Rate	Disposition
Striving to Win Glory for the Country	3.6000	0.1757	0.0667	Retained
Always Putting National Interests First	5.0000	0.0000	1.0000	Retained
Resolutely Protecting the Country	3.5333	0.2803	0.2000	Changed to "Safeguarding National Dignity"
Strong Sense of National Pride	5.0000	0.0000	1.0000	Retained
Firm Political Identity	4.8667	0.0723	0.8667	Retained

Firm National Faith	3.5333	0.2803	0.1333	Changed to "Firm Identity Belonging"
Firm Confidence in National Culture	5.0000	0.0000	1.0000	Retained
Identification with National Unity and Territorial Integrity	5.0000	0.0000	1.0000	Retained
Establishing Lofty Ideals of Dedication to the Country	3.6667	0.2854	0.2000	Changed to "Firm Commitment to Serving the Nation's Interests"
Resolutely Safeguarding National Reputation	3.6667	0.2854	0.2667	Retained
Possessing a Strong Sense of Collective Honor	5.0000	0.0000	1.0000	Retained
Firmly Complying with National Policies	3.4667	0.2405	0.0667	Deleted
Strictly Abiding by National Order	4.9333	0.0523	0.9333	Retained
Cherishing National Symbols	4.6000	0.1602	0.7333	Retained
Resisting Improper Words and Deeds	3.6000	0.2932	0.2667	Retained
Actively Spreading Positive National Energy Through Sports	4.8667	0.0723	0.8667	Retained
Closely Connecting Competitive Striving with National Honor	3.8667	0.1922	0.2000	Changed to "Striving for the Country"
Inheriting and Practicing the "Chinese Women's Volleyball Spirit"	3.4000	0.2899	0.2000	Changed to "Spiritual Inheritance"

There were 18 third-level indicators in total. The statistical results and revision details are presented in Table 5. Among them, Indicator 3 was revised to "When faced with words or actions that challenge the country, national symbols, or national heroes, can clearly express an opposing attitude"; Indicator 10 was revised to "Pays attention to appropriate words and deeds, and presents a good image"; Indicator 17 was revised to "Regards every instance of striving as fighting for national honor"; and Indicator 18 was revised to "Can use stories of the 'Chinese Women's Volleyball Spirit' or 'Country First' to inspire oneself and teammates." Indicator 12 (corresponding to the deleted second-level indicator) was deleted. Ultimately, 17 third-level indicators were retained.

Table 5. Statistical Results and Revisions of Third-Level Indicators in the First Round

Original Third-Level Indicator	Mean	Standard Deviation	Coefficient of Variation	Full-Score Rate (%)	Disposition
Regards bringing honor to the country as the primary goal in study and daily life	5.0000	0.0000	0.0000	100.00	Retained
Always places national interests above all else in study and daily life	4.6667	0.4880	0.1046	66.67	Retained
Does not allow anyone to engage in actions that tarnish the country's image in study and daily life	3.4667	0.9155	0.2641	13.33	Revised to: "When faced with words or actions that insult the country, national symbols, or national heroes, can

					clearly express an opposing attitude"
Sincerely demonstrates pride and confidence when discussing national development achievements and glorious sports history	4.00 00	1.0000	0.2500	40.00	Retained
Remains steadfast in upholding the leadership of the Communist Party of China	5.00 00	0.0000	0.0000	100.00	Retained
Takes pride in being Chinese and is willing to safeguard the image of the Chinese people	4.06 67	0.8837	0.2173	40.00	Retained
Takes pride in China's outstanding traditional culture and is willing to understand and promote it	4.13 33	0.7432	0.1798	33.33	Retained
Upholds national territorial integrity and supports national reunification	4.40 00	0.9103	0.2069	66.67	Retained
Can reflect on and plan how personal future development can serve social and national needs	5.00 00	0.0000	0.0000	100.00	Retained
Demonstrates good sportsmanship and national image in study and daily life	3.53 33	0.9904	0.2803	20.00	Revised to: "Pays attention to appropriate words and deeds, and presents a good image"
Regards team victory as the highest honor and is willing to sacrifice personal interests for team success	4.60 00	0.5071	0.1102	60.00	Retained
Proactively undertakes tasks, disregards personal gains or losses, and serves national objectives	3.26 67	0.9612	0.2942	13.33	Deleted (low full-score rate, content overlaps with B1)
Strictly abides by social rules and regards rule awareness as a fundamental respect for the collective and the nation	4.80 00	0.5606	0.1168	86.67	Retained
Maintains solemnity and reverence during flag-raising ceremonies and when singing the national anthem, with heartfelt respect	4.00 00	0.9258	0.2315	40.00	Retained (revised to: "During flag-raising ceremonies, consciously stands at attention, salutes with eyes, and remains solemn")
Does not disseminate or echo statements that harm national interests, whether online or in daily life	5.00 00	0.0000	0.0000	100.00	Retained
Is adept at using sports platforms to tell Chinese stories and disseminate positive values	4.86 67	0.5164	0.1061	93.33	Retained
Regards every instance of striving as fighting for national honor	3.40 00	0.9856	0.2899	20.00	Revised to: "Regards every instance of striving as a contribution to collective honor"

Demonstrates the spirit of "Country First" in times of difficulty	3.6000	0.9856	0.2738	13.33
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3.3.4. Analysis of the Second-Round Expert Consultation Results

Following the first round of revisions, a second-round consultation questionnaire was developed, comprising 5 first-level indicators, 17 second-level indicators, and 17 third-level indicators. The same group of 15 experts participated in this round, with all questionnaires returned, achieving a 100% response rate. The statistical analysis of the second round (as detailed in Tables 6, 7, and 8) revealed that all indicators had mean values exceeding 3.8, coefficients of variation below 0.25, and full-score rates above 20%, thereby satisfying the criteria for retention. The Kendall's W coefficients of concordance for the first-level, second-level, and third-level indicators were 0.532, 0.418, and 0.377, respectively. All asymptotic significance P-values were less than 0.01, demonstrating a high degree of consensus among the expert evaluations and ensuring the reliability of the results.

Table 6. Statistical Results of First-Level Indicators in the Second Round

First-Level Indicator	Mean	Standard Deviation	Coefficient of Variation	Full-Score Rate
Patriotic Sentiment	5.0000	0.0000	0.0000	1.0000
National Identity	4.0000	0.7559	0.1890	0.2667
Consciousness of Dedicated to the Nation	4.9333	0.2582	0.0523	0.9333
Consciousness of Upholding the Nation	3.8000	0.8619	0.2268	0.2667
Consciousness of Promoting the Nation	4.1333	0.7432	0.1798	0.3333

Table 7. Statistical Results of Second-Level Indicators in the Second Round

Second-Level Indicator	Mean	Standard Deviation	Coefficient of Variation	Full-Score Rate
Striving to Win Glory for the Country	3.9333	0.8837	0.2247	0.3333
Always Putting National Interests First	4.8667	0.3519	0.0723	0.8667
Safeguarding National Dignity	4.9333	0.2582	0.0523	0.9333
Strong Sense of National Pride	4.2667	0.7037	0.1649	0.4000
Firm Political Identity	4.8667	0.3519	0.0723	0.8667
Firm Identity Belonging	3.9333	0.8837	0.2247	0.3333
Firm Confidence in National Culture	4.7333	0.4577	0.0967	0.7333
Identification with National Unity and Territorial Integrity	4.0000	0.8452	0.2113	0.3333
Firm Commitment to Serving the Nation's Interests	4.0667	0.7988	0.1964	0.3333
Resolutely Safeguarding National Reputation	5.0000	0.0000	0.0000	1.0000
Possessing a Strong Sense of Collective Honor	3.9333	0.8837	0.2247	0.3333
Strictly Abiding by National Order	5.0000	0.0000	0.0000	1.0000
Cherishing National Symbols	5.0000	0.0000	0.0000	1.0000
Resisting Improper Words and Deeds	3.6667	0.6172	0.1683	0.0667
Actively Spreading Positive National Energy Through Sports	4.8000	0.4140	0.0863	0.8000

Striving for the Country	3.8000	0.8619	0.2268	0.2667
Spiritual Inheritance	4.1333	0.8338	0.2017	0.4000

Table 8. Statistical Results of Third-Level Indicators in the Second Round

Third-Level Indicator	Mean	Standard Deviation	Coefficient of Variation	Full-Score Rate
Regards bringing honor to the country as the primary goal in study and daily life	4.0000	0.8452	0.2113	0.3333
Always places national interests above all else in study and daily life	4.6000	0.5071	0.1102	0.6000
When faced with words or actions that insult the country, national symbols, or national heroes, can clearly express an opposing attitude	4.8667	0.3519	0.0723	0.8667
Sincerely demonstrates pride and confidence when discussing national development achievements and glorious sports history	4.0000	0.7559	0.1890	0.2667
Remains steadfast in upholding the leadership of the Communist Party of China	4.9333	0.2582	0.0523	0.9333
Takes pride in being Chinese and is willing to safeguard the image of the Chinese people	4.0000	0.7559	0.1890	0.2667
Takes pride in China's outstanding traditional culture and is willing to understand and promote it	3.8667	0.9155	0.2368	0.3333
Upholds national territorial integrity and supports national reunification	4.8000	0.5606	0.1168	0.8667
Can reflect on and plan how personal future development can serve social and national needs	4.0000	0.8452	0.2113	0.3333
Pays attention to appropriate words and deeds, and presents a good image	4.9333	0.2582	0.0523	0.9333
Regards team victory as the highest honor and is willing to sacrifice personal interests for team success	4.9333	0.2582	0.0523	0.9333
Strictly abides by social rules and regards rule awareness as a fundamental respect for the collective and the nation	3.9333	0.8837	0.2247	0.3333
During flag-raising ceremonies, consciously stands at attention, salutes with eyes, and remains solemn	5.0000	0.0000	0.0000	1.0000
Does not disseminate or echo statements that harm national interests, whether online or in daily life	3.8000	0.8619	0.2268	0.2667
Is adept at using sports platforms to tell Chinese stories and disseminate positive values	4.9333	0.2582	0.0523	0.9333
Regards every instance of striving as a contribution to collective honor	3.8667	0.9155	0.2368	0.3333
Can use stories of the "Chinese Women's Volleyball Spirit" or "Country First" to inspire oneself and teammates	4.0667	0.8837	0.2173	0.4000

4. Finalization of the Evaluation Index System and Indicator Weights

4.1. Finalization of the Evaluation Index System

Following two rounds of Delphi expert consultation, which involved 15 experts specializing in ideological and political education, volleyball teaching, sports team training, and Olympic champions, an expert authority coefficient (Cr) of 0.868 was

achieved, reflecting a high level of authority. Using screening criteria of a mean value greater than 3.50, a coefficient of variation below 0.25, and a full-score rate exceeding 20%, the initially proposed 5 first-level indicators, 18 second-level indicators, and 18 third-level indicators were systematically refined [11]. As a result, the "Evaluation Index System for the Educational Outcomes of the 'Country First' Spirit in University Volleyball Courses" was finalized, comprising 5 first-level indicators, 17 second-level indicators, and 17 third-level indicators, as outlined in Table 9.

Table 9. Final Evaluation Index System

First-Level Indicators	Second-Level Indicators	Third-Level Indicators
A Patriotic Sentiment	A1 Striving to Win Glory for the Country	A1-1 Regards bringing honor to the country as the primary goal in study and daily life
	A2 Always Putting National Interests First	A2-1 Always places national interests above all else in study and daily life
	A3 Safeguarding National Dignity	A3-1 When faced with words or actions that insult the country, national symbols, or national heroes, can clearly express an opposing attitude
	A4 Strong Sense of National Pride	A4-1 Sincerely demonstrates pride and confidence when discussing national development achievements and glorious sports history
B National Identity	B1 Firm Political Identity	B1-1 Remains steadfast in upholding the leadership of the Communist Party of China
	B2 Firm Identity Belonging	B2-1 Takes pride in being Chinese and is willing to safeguard the image of the Chinese people
	B3 Firm Confidence in National Culture	B3-1 Takes pride in China's outstanding traditional culture and is willing to understand and promote it
	B4 Identification with National Unity and Territorial Integrity	B4-1 Upholds national territorial integrity and supports national reunification
C Consciousness of Dedication to the Nation	C1 Firm Commitment to Serving the Nation's Interests	C1-1 Can reflect on and plan how personal future development can serve social and national needs
	C2 Resolutely Safeguarding National Reputation	C2-1 Pays attention to appropriate words and deeds, and presents a good image
	C3 Possessing a Strong Sense of Collective Honor	C3-1 Regards team victory as the highest honor and is willing to sacrifice personal interests for team success
D Consciousness of Upholding the Nation	D1 Strictly Abiding by National Order	D1-1 Strictly abides by social rules and regards rule awareness as a fundamental respect for the collective and the nation
	D2 Cherishing National Symbols	D2-1 During flag-raising ceremonies, consciously stands at attention, salutes with eyes, and remains solemn
	D3 Resisting Improper Words and Deeds	D3-1 Does not disseminate or echo statements that harm national interests, whether online or in daily life

E Consciousness of Promoting the Positive Nation	E1 Actively Spreading Through Sports	E1-1 Is adept at using sports platforms to tell Chinese stories and disseminate positive values
	E2 Striving for the Country	E2-1 Regards every instance of striving as a contribution to collective honor
	E3 Spiritual Inheritance	E3-1 Can use stories of the "Chinese Women's Volleyball Spirit" or "Country First" to inspire oneself and teammates

4.2. Determination of Indicator Weights

(1) Step 1: Develop a structural model for the evaluation index system of educational outcomes in university volleyball courses [12].

(2) Step 2: Construct the judgment matrices [13]. Using the 5 first-level indicators and the 4 second-level indicators under the first-level indicator (Patriotic Sentiment) as examples, pairwise comparisons and assignments were conducted among the 5 first-level indicators and the 4 second-level indicators. The assignment criteria are detailed in Table 10. The judgment matrices of the 15 experts were then aggregated using the geometric mean method, as shown in Tables 12 and 13.

Table 10. The 1-9 Ratio Scale of Importance Levels for Elements and Their Meanings

Scale Value	Meaning
1	When comparing two indicators, they are of equal importance
3	When comparing two indicators, the former is slightly more important than the latter
5	When comparing two indicators, the former is clearly more important than the latter
7	When comparing two indicators, the former is strongly more important than the latter
9	When comparing two indicators, the former is extremely more important than the latter
2, 4, 6, 8	Intermediate values between the above adjacent judgments
Reciprocal	When comparing two indicators, the latter is more important than the former to the corresponding degree

(3) When experts perform pairwise comparisons of indicators, inconsistencies may occur [14]. Therefore, consistency tests on the judgment matrices are necessary to ensure the rationality of the indicator weights. The most commonly used methods for calculating the maximum eigenvector of a pairwise comparison matrix are the sum-product method and the root method. This study employs the sum-product method, with the calculation steps outlined below:

1 Normalize each column vector of matrix $A = (a_{ij})_{n \times n}$ to derive $B = (b_{ij})_{n \times n}$.

$$b_{ij} = \frac{a_{ij}}{\sum_{i=1}^n a_{ij}}$$

2 Sum the row vectors of the normalized matrix B.

$$M_i = \sum_{j=1}^n b_{ij}$$

3 $M = \begin{bmatrix} M_1 \\ M_2 \\ \dots \\ M_n \end{bmatrix}$ Normalize the vector to obtain the eigenvector W.

$$W_i = \frac{M_i}{\sum_{i=1}^n M_i}$$

Obtain the eigenvector $W_i = \begin{bmatrix} W_1 \\ W_2 \\ \dots \\ W_n \end{bmatrix}$

4 Calculate the maximum eigenvalue λ_{max} .

$$\lambda_{max} = \frac{1}{n} \sum_{i=1}^n \frac{[AW]_i}{W_i}$$

(4) Consistency test of the judgment matrix

1 Calculate the consistency index CI.

$$CI = \frac{\lambda_{max} - n}{(n-1)}$$

2 Calculate the consistency ratio CR [7].

$$CR = \frac{CI}{RI} = \frac{\lambda_{max} - n}{(n-1)RI}$$

RI represents the random consistency index, with specific values provided in Table 11.

Table 11. Mean Random Consistency Index (RI) Values for Judgment Matrices

Matrix Order	1	2	3	4	5	6	7	8	9	10	11	12
RI	0	0	0.52	0.89	1.12	1.26	1.36	1.41	1.46	1.49	1.52	1.54

The criteria for consistency testing are as follows: For judgment matrices with $n < 3$, they are always considered to have perfect consistency. For judgment matrices with $n \geq 3$, if the calculated $CR < 0.1$, the matrix is deemed to meet the requirements and passes the consistency test. Otherwise, the scale values of the elements must be readjusted, and the matrix reconstructed until the requirements are satisfied [8] (As shown in Table 12, 13).

Table 12. Judgment Matrix and Weight Calculation for First-Level Indicators

Target Layer	A Patriotic Sentiment	B National Identity	C Consciousness of Dedicating to the Nation	D Consciousness of Upholding the Nation	E Consciousness of Promoting the Nation	Weight	λ_{max}	CI	CR
A Patriotic Sentiment	1	5	2	6	5	0.4342	5.1928	0.0482	0.0443
B National Identity	0.2	1	0.2	2	0.5	0.0761			
C Consciousness of Dedicating to the Nation	0.5	5	1	6	5	0.3297			
D Consciousness of Upholding the Nation	0.1667	0.5	0.1667	1	0.3333	0.0496			
E Consciousness of Promoting the Nation	0.2	2	0.2	3	1	0.1104			

Table 13. Judgment Matrix and Weight Calculation for Second-Level Indicators under the "Patriotic Sentiment" Dimension

A Patriotic Sentiment	A1 Striving to Win Glory for the Country	A2 Always Putting National Interests First	A3 Safeguarding National Dignity	A4 Strong Sense of National Pride	Weight	λ_{max}	CI	CR
A1 Striving to Win Glory for the Country	1	0.2	0.2	0.3333	0.0669	4.1611	0.0537	0.0603
A2 Always Putting	5	1	0.5	4	0.3330			

National Interests First					
A3					
Safeguarding National Dignity	5	2	1	4	0.4696
A4 Strong Sense of National Pride	3	0.25	0.25	1	0.1305

4.3. Calculation of Total Indicator Weights

By aggregating the calculated results, the relative weights of each indicator are determined. The composite weights are derived through successive multiplication of the relative weights across hierarchical levels. These composite weights reflect the hierarchical ranking of the lowest-level indicators in relation to the overall objective. For instance, the composite weight of "A1 Striving to Win Glory for the Country" is calculated by multiplying its weight within the "A Patriotic Sentiment" level by the weight of that level. All calculations are rounded to four decimal places [13]. The same methodology is applied to the other indicators. The detailed results are presented in Table 14 below.

Table 14. Weight Determination Table for Each Indicator

First-Level Indicators	Second-Level Indicators	Third-Level Indicators
A Patriotic Sentiment (0.4342)	A1 Striving to Win Glory for the Country (0.0290)	A1-1 Regards bringing honor to the country as the primary goal in study and daily life (0.0026)
	A2 Always Putting National Interests First (0.1446)	A2-1 Always places national interests above all else in study and daily life (0.0413)
	A3 Safeguarding National Dignity (0.2039)	A3-1 When faced with words or actions that insult the country, national symbols, or national heroes, can clearly express an opposing attitude (0.1097)
	A4 Strong Sense of National Pride (0.0566)	A4-1 Sincerely demonstrates pride and confidence when discussing national development achievements and glorious sports history (0.0050)
B National Identity (0.0761)	B1 Firm Political Identity (0.0374)	B1-1 Remains steadfast in upholding the leadership of the Communist Party of China (0.0185)
	B2 Firm Identity Belonging (0.0054)	B2-1 Takes pride in being Chinese and is willing to safeguard the image of the Chinese people (0.0005)
	B3 Firm Confidence in National Culture (0.0251)	B3-1 Takes pride in China's outstanding traditional culture and is willing to understand and promote it (0.0017)
	B4 Identification with National Unity and Territorial Integrity (0.0081)	B4-1 Upholds national territorial integrity and supports national reunification (0.0027)
C Consciousness of Dedicated to	C1 Firm Commitment to Serving the Nation's Interests (0.0574)	C1-1 Can reflect on and plan how personal future development can serve social and national needs (0.0052)

	the Nation (0.3297)		
		C2 Resolutely Safeguarding National Reputation (0.2382)	C2-1 Pays attention to appropriate words and deeds, and presents a good image (0.1083)
D Consciousness of Upholding the Nation (0.0496)		C3 Possessing a Strong Sense of Collective Honor (0.0341)	C3-1 Regards team victory as the highest honor and is willing to sacrifice personal interests for team success (0.0155)
		D1 Strictly Abiding by National Order (0.0231)	D1-1 Strictly abides by social rules and regards rule awareness as a fundamental respect for the collective and the nation (0.0037)
		D2 Cherishing National Symbols (0.0231)	D2-1 During flag-raising ceremonies, consciously stands at attention, salutes with eyes, and remains solemn (0.0171)
		D3 Resisting Improper Words and Deeds (0.0033)	D3-1 Does not disseminate or echo statements that harm national interests, whether online or in daily life (0.0003)
E Consciousness of Promoting the Nation (0.1104)		E1 Actively Spreading Positive National Energy Through Sports (0.0734)	E1-1 Is adept at using sports platforms to tell Chinese stories and disseminate positive values (0.0531)
		E2 Striving for the Country (0.0115)	E2-1 Regards every instance of striving as a contribution to collective honor (0.0012)
		E3 Spiritual Inheritance (0.0255)	E3-1 Can use stories of the "Chinese Women's Volleyball Spirit" or "Country First" to inspire oneself and teammates (0.0044)

5. Conclusion

Grounded in the practical requirements of curriculum-based ideological and moral education in university physical education courses in the new era, and centered on the core value orientation of the "Country First" spirit, this study established an evaluation index system comprising 5 first-level indicators (Patriotic Sentiment, National Identity, Consciousness of Dedication to the Nation, Consciousness of Upholding the Nation, and Consciousness of Promoting the Nation), 17 second-level indicators, and 17 third-level indicators through two rounds of Delphi expert consultation. The Analytic Hierarchy Process was used to calculate the weights of indicators at each level, and all judgment matrices passed the consistency test ($CR < 0.1$). The expert authority coefficient $Cr = 0.868$ indicates that the research results have a high degree of scientific validity and reliability.

The construction of this evaluation index system fills the instrumental gap in the quantitative assessment of the "Country First" spirit within the context of the deep integration of red culture education and curriculum-based ideological and moral education in volleyball courses. It provides a scientific basis for the accurate evaluation of educational effectiveness in university physical education courses and offers an operable measurement tool for volleyball course teaching improvement, optimization of instructional element design, and feedback on educational outcomes. By transforming abstract value concepts such as patriotic sentiment and national identity into observable and assessable indicators, the "Country First" spirit is translated from conceptual advocacy into educational practice, thereby supporting the educational objectives of improvement through evaluation, enhancement through evaluation, and consolidation through evaluation.

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